**REMARKS**

At the outset, the applicants Dr. Prakash, Dr. Rodrigues, Mr. Karmes and attorney Deshmukh take this opportunity to sincerely thank Examiner Stafira for graciously agreeing to conduct the interview on May 10, 2005. Applicants through illustration distinguished the current invention from the cited art. All the outstanding rejections were reviewed. No agreement was reached.

The rejection under 35 U.S.C. § 103(a) of claims 1-4, 16-23, 25-27, 40-42 and 44 as being unpatentable over US 5,963,334 to Yamaguchi et al. (hereafter D1) over US 5,583,642 to Nakazono (hereafter D2) is respectfully traversed in view of the following remarks:

Surface coatings containing metallic flake pigments, such as aluminum flakes, are especially favored for the protection and decoration of automobile bodies, since they impart a differential light reflection effect, usually referred, to as "flop", as well as flake appearance effects, which include flake size distribution and the sparkle imparted by the flake as well as the enhancement of depth perception in the coating. The "flop" effect is dependent upon the angle from which the car body is viewed. The degree of the flop effect achieved, is a function of the **orientation of the metallic flakes** with respect to the outer surface of the coating. **By contrast, the degree of sparkle is a function of the flake size, surface smoothness, orientation, and uniformity of the edges of the flakes.** Metallic coatings usually also contain pigments, generally of a light absorbing rather than a light scattering type.

Instrumental characterization of metallic pigmented coatings, such as that disclosed in D1 are carried out by measuring with a spectrophotometer **the spectral reflectance** of a coated panel at a number of angles of incident illumination and of viewing, either within the plane of the illumination and viewing axis, or outside of such plane. The results of such measurements are dependent on the degree of flake alignment as well as the type of flake or other pigments used i.e., on the "flop" of the coating, but these results offer no way of determining the **degree of sparkle or flake size of the flakes in the coating.** Additionally, since these **spectral reflectance** measurements are also dependent on the relative concentrations of the metallic flake and on the

presence or absence of any light-absorbing or scattering pigment in the coating composition, their value in characterizing the coating is diminished.

In color matching for example, a previously coated substrate of an automotive body, it is necessary to choose the correct pigments to match the color of that substrate as well as the correct type of flake to match the color and appearance of that substrate. For an effective measure of the flake characteristics, such as flake size, flake size distribution or degree of sparkle to be obtained, it is necessary for a shader to select, based on his expertise, the metallic flake to be used by visually analyzing the target surface. Once the flake has been identified, the pigments can be selected, typically by well known computer based algorithms, such as those based on radiative transfer theory, which mathematically adjust the pigment quantities, add or reduce black and white pigments quantities, and flop adjuster quantities, including flake quantities, so that the error in the color and flop match to the target surface is the lowest while ensuring that the resulting color/flop formulation is still within the bounds of accepted commercial practice. This formulation is then made up, sprayed on test panels, which are then visually compared to the target surface. If the flop and/or sparkle match are deemed unsatisfactory, the shader adjusts the type and/or changes the amount of the metallic flakes entered into the algorithm to get new color/flop formulation and the whole cycle is repeated until an adequate match is achieved in both color and appearance at all angles of illumination and view. D1 does not offer any help in reducing the foregoing manual and repetitive process steps.

By contrast, the present invention is aimed at developing a method that substantially reduces the number of aforementioned repeat matches needed for the selection of metallic flakes that closely match the appearance of metallic flakes present in the target surface.

With the foregoing background, it would be readily apparent that D1 taken alone or in combination with D2 would not lead one of ordinary skill in the art to arrive at the current invention.

Flake containing coatings have color properties as well as spatial visual appearance properties. Color and change in color is distinct from spatial visual appearance. The former is a gross measurement over the entire field of view whereas the latter is variation within the field of view and is also

described as sparkle, flake size and other such terms. The cited art deals with characterizing color and color change effects. None of them attempt to measure or characterize spatial appearance due to the flake.

Yamaguchi teaches measurement and display of spectral reflection curves at specific illumination/viewing geometries and further show that at large angles from specular reflection, the use of radial illumination is unnecessary. Thus, Yamaguchi utilizes radial illumination/unidirectional sensing at low angles (2 measurements) and unidirectional illumination/unidirectional sensing at high angles (2 more measurements). The spectral reflection curves for these four geometries are then displayed and represent the color and its angular metamerism. The basic thrust is to create a simpler, less expensive way of building hardware to measure color. Yamaguchi's teachings are unrelated to capturing or measuring the sparkle in an image of the area of interest and subsequently developing a formulation prediction of what flake(s) to use.

Thus, unlike the claims of the present invention, D1 is directed to a color measuring apparatus directed at measuring pluralities **color values** under multiple illuminations directed at multiple angles of a target color coating containing metallic flakes (See Abstract of D1). By contrast, the present invention is directed to capturing **images of flakes** in target coating for determining the **flake size, flake size distribution and degree of sparkle of flakes** in the target coating. The foregoing is patentably distinct from measuring the color values of a target coating. Thus, it is not seen why D1 in view of D2 renders the current claims obvious.

The remark in the Office Action that D1 discloses means for imaging (Fig. 4, Ref. 33) is respectfully traversed. The spectral light receiving device 33 of D1 is directed at separating reflected light rays into beams of respective wavelengths by means of a spectral filter 331 and then producing electrical signals that correspond to the intensities of the reflected beams of the respective wavelengths by means of light receiving elements 332, such as diodes (D1 at column 9, lines 45-55), and NOT to producing an image of flakes within the target coating through an imaging device, such as that described on page 8, lines 1-15 f the specification. Yamaguchi also clarifies the foregoing at column 9, line 61 (The CPU 42 performs a variety of

calculations in accordance with a program stored in ROM 43 in advance, thereby obtaining a **color value of the measurement object 1** as described later). The foregoing comments also apply to the comments made in the Office Action regarding claim 4.

The remark in the Office Action that D1 discloses means for measuring characteristics of metallic flakes in the target image (Fig. 4, Ref. 42) is respectfully traversed. CPU 42 in D1 provides color value of the measurement object 1. It does NOT measure the characteristics of metallic flakes in the target image (D1 at column 9, lines 59-64).

The remark in the Office Action that D1 discloses means for displaying said identified one or more known metallic flakes that match said characteristics of unknown metallic flakes in the target image (Fig. 4, Ref. 45 and column 11, lines 42-49) is respectfully traversed. The display device 45 of D1 displays **the color value of the coating** obtained by the calculations performed by CPU 42 in accordance the program stored in ROM 43. It does NOT **display the identified one or more known metallic flakes** that match said characteristics of unknown metallic flakes in the target image (D1 at column 9, lines 59-64, at column 10, line 1 and column 11, lines 45-49). Thus, even if one were to combine the teachings of D1 and D2, it would be impossible to characterize the unknown metallic flakes, such as those claimed in the present invention.

In view of the foregoing remarks it is not seen why D1 in combination with D2 would render the present claims unpatentable.

The remarks in the Office Action that D2 shows that it is known to provide means for correlating characteristics of unknown metallic flakes in a target image to stored characteristics of known metallic flakes at said present intensity to identify one or more said known metallic flakes that match said characteristics of unknown metallic flakes for a method of determining color tone of a coating is respectfully traversed (column 5, lines 16-65 of D2). Step (vii) of the present invention is not used to determine the color tone or flop value of a coating. Thus, it is not seen how the teaching in D2 even when combined with the teaching in D1 would result in the claims of the present invention. It should be noted that the review of entire D2 failed to show up a single reference to the term "stored" or "store" anywhere. Thus, it is not seen

what "stored characteristics" were being referred to in the Office Action. It is also not clear to what ratio is referred to in the Office Action allegedly for the purpose of providing "a ratio that can be compared to a reference".

Furthermore, there is no teaching or suggestion of means (viii) for displaying the identified one or more metal flakes that match the characteristics of the unknown metal flakes in D1.

The remarks in the Office Action in reference to the current claim 2 that D1 discloses a beam splitter (Fig. 4, Ref 334) is respectfully traversed. As noted at column 11, lines 8-20 in D1, it is clear that movable mirror 34 is NOT a beam splitter but a mirror that is moved out of the way by switch motor 35. By contrast, as noted on page 8, lines 25-33 and page 9, lines 1-4 of the current specification, the beam splitter 17 of current invention is a two way mirror which permits transmission of beam of light from light source to target surface **at a normal angle** to the target surface and transmission of a beam of target image to the imaging device also **at a normal angle** to the target surface. No such geometry is either disclosed or taught in either D1 or D2. As can be seen in Fig. 4 of D1, the illumination units 21, 22 and 23 are positioned at angles 25°, 45°, and 65° from normal. Thus, there is no teaching any where in D1 of directing a beam of light at a normal angle to the target. By contrast, as shown in Fig. 1 of the present invention, it is clear that incoming and outing going beams of light are at a normal angle to the target substrate.

In view of the foregoing remarks, it is respectfully submitted that the aforecited present claims are not obvious over D1 in view of D2.

Should the Examiner wish to discuss any issues involved in this application, the Examiner is respectfully invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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